

the different methods of mining, and the proper handling of the various pieces of equipment used in mining. Some of the larger mines provide courses of practical training. During training the new miner also becomes thoroughly familiar with the precautions and regulations necessary for mine safety.

Some schools provide specialized courses in mining. Two such schools are the Provincial Institute of Mining, Haileybury, Ontario, and the Lakehead Technical Institute, Port Arthur, Ontario. Correspondence course material in mining techniques is available from the Provincial Institute of Technology and Art, Calgary, Alberta — mainly for those already in the industry who wish to study for promotion.

In recent years prospectors have had the opportunity of attending lectures on prospecting and geology. These lectures are government-sponsored and are usually held in towns located in mining areas, or at universities.

Skilled tradesmen, such as carpenters, plumbers and electricians, are trained by apprenticeship in the manner prescribed by their individual trades.

ENTRY INTO THE INDUSTRY

Persons desiring to enter this industry should consult with officials of the National Employment Service. Applications are also accepted directly at the offices of mines, mills and smelters. Assistance in securing employment in a mine may also be obtained from union officials or from the placement officer of a mining school. Information about opportunities for employment in mining is often available from provincial Departments of Mines.

EARNINGS

The wages paid to miners in different regions of the country may vary considerably, depending on the type and location of the mine, the demand for the mineral being mined, and the specific work performed. The average earnings of mine employees are well above the average for all industries. Detailed information as to the wages of miners may be obtained from a current copy of *Wage Rates and Hours of Labour*, published by the Department of Labour, Ottawa.

ADVANCEMENT

The usual line of promotion in underground mines is from labourer or mucker to helper and then to miner. Skilled miners and other workers having the necessary qualifications may become foremen or shift bosses. Skip tenders and cage tenders may become hoistmen. Surface workers may be promoted to foreman.

In open-pit mines labourers generally become helpers, then drillers or machine operators. Experienced workers selected as drill foremen may advance to shift boss and eventually pit foreman.

Technicians such as assayers and surveyors are often graduates of mining schools. Other technicians are chosen from among surface, mill or underground workers having the education and experience necessary for more technical processes.

ADVANTAGES AND DISADVANTAGES

The mining industry provides employment for many persons having only a limited amount of education. Earnings and opportunities for advancement are much better than those possible in other industries requiring similar training and education.

Many mining companies provide for holidays with pay, hospitalization, medical insurance, retirement plans and other benefits.

The isolated location of many mines could be considered a disadvantage by some. In many cases, company houses are provided at low rents and company-owned stores supply many of the necessities at reasonable prices.

The discomforts of working in surroundings that are sometimes cramped, often dirty, dusty or damp, has, to some extent, been reduced by the use of special protective clothing, improved mining techniques, and the use of machinery. Occupational hazards arising from the use of power equipment and the dangers of explosion, falling rock, dust, gas and cave-ins are reduced by strict adherence to mine safety rules.

Mine workers in Canada are strongly unionized.

FUTURE PROSPECTS

The future of mining is bright. It is expected that the industry as a whole will continue to expand for an indefinite period. Immediate prospects for employment in coal mining are less promising, as this branch of the industry has suffered from a loss of markets. The situation may change if new markets and new uses for coal are found. The mechanization of existing coal mines may eventually result in a demand for skilled operators of coal mining machines.

Only a fraction of Canada's potential mineral wealth has been developed, and it is likely that many new deposits will be discovered in the future. Other countries are becoming more and more dependent on Canada's mineral production and this, with an increasing market for mine products, will tend to provide a wide variety of employment opportunities for mine workers at all levels of skill.

WOULD YOU LIKE FURTHER INFORMATION?

Vocational guidance counsellors, teachers and National Employment Service officers have been supplied with a monograph in which the mining occupations have been described in greater detail. They may also have special knowledge of conditions as they exist in your own locality. Talk your plans over with them, and also make enquiries of persons connected with the industry.

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"CANADIAN OCCUPATIONS" SERIES

The following pamphlets have been published in this series:

- (1) Carpenter
- (2) Bricklayers and Stone-Masons
- (3) Plasterer
- (4) Painter
- (5) Plumber, Pipe Fitter and Steam Fitter
- (6) Sheet-Metal Worker
- (7) Electrician
- (8) Machinist and Machine Operators (Metal)
- (9) Printing Trades
- (10) Motor Vehicle Mechanic
- (11) Mining Occupations
- (12) Foundry Workers
- (13) Technical Occupations in Radio and Electronics
- (14) Forge Shop Occupations
- (15) Tool and Die Makers
- (16) Railway Careers
- (17-35) Careers in Natural Science and Engineering
- (36) Hospital Workers (Other than Professional)
- (37) Draughtsman
- (38) Welder
- (39) Occupations in the Aircraft Manufacturing Industry
- (40) Careers in Construction

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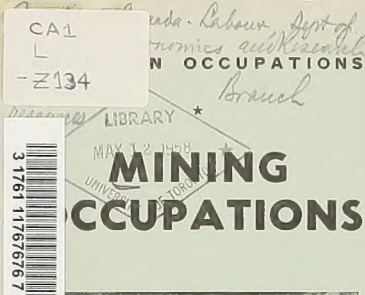


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DEPARTMENT OF LABOUR, CANADA

MINING OCCUPATIONS

PAMPHLET 14

Mining is one of the oldest industries known to man. Minerals have been searched for, extracted from the earth and used in one form or another since the flint-weapon days of the cavemen.

In Canada, organized mining began about 200 years ago and the systematic prospecting for minerals about 100 years later. We now know that Canada is a veritable storehouse of mineral wealth. The widespread distribution of this wealth has raised our standard of living, provided employment for thousands of workers, and made this one of the greatest mining countries in the world. Already the leading producer of nickel, platinum and asbestos, Canada ranks high in other minerals such as gold, cadmium, selenite, zinc, lead, silver, cobalt and copper.

TYPES OF MINES

Although we usually think of a mine as being an underground operation, several methods of recovering minerals are used in Canada today.

In underground mines the ore body is approached either through a vertical shaft or a sloping tunnel driven into the side of a mountain. Some Canadian mines operate at more than 8,000 feet below ground level and have many miles of subterranean passageways running out from the shaft. A number of metal and coal mines along the eastern seaboard have "working faces" situated several miles out from the mainland beneath the floor of the ocean.

Open-pit (surface) methods are used to recover deposits lying in a broad area close to the surface. Substantial amounts of iron ore, copper and other minerals are mined in this way. This method is also used to obtain many of the materials used in the construction industry, and is often called quarrying.

Strip-mining, a term used in the coal industry, refers to the mining of coal from surface beds by open-pit methods.

Placer mines are the exception, on a relatively small scale, in the gold fields of the Yukon Territories and the northern sections of British Columbia.

The development of oil and natural gas fields is another type of mining operation, but the methods of extraction are quite different and will not be considered in this pamphlet.

WHAT MINERS DO

Mining may be divided into a number of stages—*exploration, development, extraction, and ore treatment*. The duties are much the same for all mines, with some variations, especially in coal mines.

The *mine manager*, usually a graduate mining engineer, is responsible for mine operations, assisted by a *mine superintendent* and a *mill superintendent*.

Exploration

Prospectors search for mineral deposits, travelling by aircraft, boat, packhorse, or on foot into remote and unexplored regions. Modern prospecting is a highly skilled occupation and the prospector must be familiar with geology and the use of scientific equipment. When he locates signs of a mineral deposit he obtains samples to be tested.

If the tests are promising, *diamond drillers* continue the work of the prospector by tracing the ore body far below the earth's surface. This is done by drilling into the rock and bringing up "core" samples for examination.

Assayers and their assistants analyse the samples to determine the value of the mineral content of the ore.

Development

The establishment of a mine is, in many respects, a specialized construction job. The amount of development required depends on the location of the deposit and the type of mine that is necessary. It is not uncommon for a mining company to construct roads, railroads and even complete towns to service mines located in isolated areas and to accommodate mine workers and their families.

In the development of an open-pit mine, the layer of waste rock and soil covering the deposit is removed by *bulldozer* and *power-shovel operators*. The exposed ore is then blasted loose and excavated in a series of steps or benches. The open-pit may eventually become too deep to be mined economically, at which point underground mining methods will be introduced.

Underground mines require the greatest amount of development work. *Mine surveyors* survey the surface area of the mine and indicate on a map any physical features that might be of importance. They also make accurate drawings of all underground workings.

Crews of *miners* sink the main shaft, drilling, blasting and mucking out the ore or waste rock, and establish mine stations at various levels. Other crews of miners drive passageways through the rock to the ore body. Where necessary, *timbermen* brace the walls and roof with timbers to prevent cave-ins. They also build the cribs, chutes, ladders and other frameworks necessary in the mine.

The systems of ventilation, water supply, drainage, power and transportation needed in underground mines are installed and maintained by *sheet-metal workers, pumpmen, pipe fitters, electricians, compressor-men* and other tradesmen.

Tool and steel sharpeners, machinists, blacksmiths, diesel mechanics, welders and tradesmen's helpers provide services essential to the development and continued production of a mine.

Extraction of Ore (Metal Mining)

Miners, the key men in a mine, are usually known by the machines they operate or the work they do.

Drillers start the process of extracting ore by boring a pattern of holes into the working face of the mine. *Blasters* then charge these holes with explosives and, after arranging for the safety of the area, set off the charge. When blasting has been completed and the ventilation system has drawn off the fumes, dust and smoke, the miners inspect the area, "bar down" any loose ore and install timbers or rock bolts to support the roof.

Muckers then shovel the ore directly into mine cars or into ore chutes from which the cars are loaded. In many mines, *mucking machine operators* load the mine cars by means of a mechanical mucker. *Chute blasters* keep the chutes flowing freely. *Tyramen* push the loaded ore cars to the haulageways where *motormen*, operating mine locomotives, haul the trains of cars to the shaft.

Cage tenders are in charge of the mine cages that carry men, equipment and supplies between the various levels of the mine and the surface. *Skip tenders* are in charge of loading and hoisting of the skips (large metal buckets used to carry ore) to the surface. The *hoistman* receives signals from the cage and skip tenders and operates the hoisting equipment to raise or lower the shaft conveyances as required.

Ore being removed from the mine is constantly checked for mineral content. Samples of ore are chosen from the bins, conveyors, and mine cars by the *sampler*. He also obtains samples from the working face of the mine by drilling or chipping off pieces of ore. *Diamond drillers* obtain core samples from the ore body lying beyond the working face of the mine. The samples of ore are bagged and sent to the assay office of the mine for analysis.

Ore Treatment

As minerals are seldom mined in their pure state, the ore must be prepared for the extraction of the mineral.

Ore graders grade the ore and *crushermen* put it through huge crushing machines to reduce it in size. *Grinding mill operators* operate ball or rod mills that further reduce the ore to a floury consistency. It can then be put through a variety of separating and extracting processes. *Solutionmen, flotation operators and filter operators* are all engaged in the separation of minerals in solution. In some processes the mineral may be extracted by magnetism; in others the ore is roasted to burn off the undesirable substances.

Coal Mining

Coal mining is traditionally different from hardrock mining, owing to the nature of coal seams and certain hazards such as explosive gases and dust. Coal, being softer than rock, allows for different extraction methods, particularly in the use of machinery. The "pick and shovel" coal miner is being replaced by operators of coal cutting machines that shear through the seams, mechanical loaders, and by continuous mining machines that cut coal from the seam and load it into mine cars, all in one operation.

The *fire boss* is responsible for production and the safety of the workers in a coal mine. He inspects the area for gas, explosive dust and, following blasting, for any fires that may have broken out. Blasting must be done by a certified fire boss (in some mines known as a *shot-firer*). *Bratticemen* install partitions in the underground passageways to control ventilation in the mine. *Brushers* enlarge passageways, keep them clear, and install permanent rock supports.

Miners, machine cutters and machine loaders are the workers who are primarily engaged in extracting the coal from the seams. *Contract miners* are paid according to the amount of coal they extract. *Dial miners* are paid on an hourly basis. The *loader and bucker* shovels coal as it passes down the chutes, loads mine cars and pushes loaded cars to the main haulageway.

Weighmen weigh the cars of coal as they leave the mine and keep records of the tonnage produced. Large pieces of rock and slate are removed by *rock pickers*. Breakers break the coal up into several different sizes which are then separated out on shaker screens, controlled by *shakemen*. The coal is then put into one of a variety of coal cleaning machines, tended by *cleaning plant operators*. *Car loaders* load the cleaned, sized and graded coal into boxcars or gondolas for shipping.

QUALIFICATIONS

Provincial regulations govern the minimum ages for employment in and around a mine. Generally, no one under 18 years of age is permitted to work underground.

No specific standard of education is required, although a knowledge of English or French is desirable. Those who have more schooling will stand a better chance of getting ahead.

Miners must have strong physiques, free from any handicapping disabilities or lung conditions. Underground workers and certain classes of surface workers must obtain an identification card certifying that they have passed a physical examination, including a chest X-ray.

To work as part of a team, in close quarters and in areas of potential danger, a miner must have a good sense of co-operation, steady nerves, and the ability to think clearly and to act quickly in an emergency.

Coal mine officials and certain of the operative classes require a certificate of competency through examination by the provincial Departments of Mines. Qualifications for open-pit mining may not be as strict as those for underground mining.

TRAINING

Miners usually train on the job. Under the supervision of skilled workers, the beginner becomes accustomed to mining conditions, learns